

THE COCCIDAE OF THE CASUARINAS.

By WALTER W. FROGGATT.

(Plate xxix; thirty-six Text-figures.)

[Read 27th September, 1933.]

The Casuarinas, popularly known as Sheoaks or Bulloaks, are remarkable in having no true foliage. The main branches spread out from the stem and carry slender cylindrical jointed branchlets, with each ring encircled with small bracts which represent the leaves.

As might be expected, the insect fauna of the Casuarina is as interesting as the tree, for they adapt their structure to the form of the branchlets. The insects which feed upon, or attach themselves to, the branchlets are usually elongate or angulate when they affix themselves at the base of the branchlet with its attachment to the stem.

The members of the two gall-making genera, *Cylindrococcus* and *Frenchia*, were first collected in Victoria by French, who sent them to New Zealand for Maskell to name and describe. The first are wonderfully like the seed cones of their host trees and may be formed upon the branches or the tip of the branchlets. The second are double galls, forming on the stems, the basal portion forming a swelling of the tissue, from which, in the typical form, projects a hollow tube, rounded at the tip, in which the female coccid is resting.

In the following pages I briefly describe these, list other coccids previously described, and add some new species.

ASPIDIOTUS CINGULATUS Green.

This is a very distinctive species, which I figured and described in my Descriptive Catalogue (pt. 1, p. 10). It comes from the Mallee scrublands of North-west Victoria, infesting the branchlets of *Casuarina lepidophloia*. The large dark brown scales are so broad that they curl round the branchlets they infest.

GYMNASPIS SERRATUS, n. sp. Text-figs. 21, 22.

The female tests black, shining, circular, convex, scattered all over the branchlets. Diameter 1 mm. *Habitat*: New South Wales, on *Casuarina* sp.

♀. Coccid light chocolate-brown, broadly oval, broadest across the posterior portion. Derm showing no definite hairs or spines, slightly crenulated on the sides. Antennae composed of eight segments of uniform thickness: 1 very short, 2 small, 3 longest, 4, 6 of uniform length, 7 small, 8 irregular in form; the whole fringed with fine hairs from segment 3 to the tip. Pygidium with a pair of finely striated chitinous plates, hardly projecting beyond the margin of the anal segment. The whole almost truncate, with the inner area between the plates angular.

LEPIDOSAPHE (MYTILASPIS) CASUARINAE Maskell.

This is the most abundant and widely spread coccid infesting the Casuarinas. Usually the branchlets are so thickly incrustated with the white scales that they are very noticeable.

The white female test is so finely striated that, in a bright light, it is iridescent. The pellicles are reddish-brown, the first oval and very prominent; the second large, rounded behind, and fitting in the test. Length, 2 mm. It is variable in size, those upon the Myall and native cherry being larger than the type.

Hab.—Sydney, on *Casuarina suberosa*; Pilliga Scrub and Euston, N.S.W., on *Casuarina lepidophloia*; Leeton, N.S.W., on the same species (Keith McKeown); Millmerran, Queensland, same species (J. Macqueen); Trangie, N.S.W., on *Casuarina Cambagei* (W.W.F.); Perth, W.A., *Casuarina* sp. (L. J. Newman). Also upon *Exocarpus cupressiformis*, Crookwell, N.S.W., and *Acacia* sp., Dubbo, N.S.W. (W.W.F.).

LEPIDOSAPHES HILLI Laing.

Bull. Entom. Research, xx, pt. 1, 1929, p. 118, f. 17.

This species is closely allied to *L. casuarinae*; Mr. Laing says that the external characters of the puparium are very similar and at first he treated his two lots of material as Maskell's species. He defines it as a new species on the structure of the pygidium, in the shape of the trullae and lobules of the adult female, which he figures. The specimens were collected upon undetermined species of *Casuarina* from Biniguy, New South Wales, and Chinchilla, Queensland, by Mr. Gerald F. Hill.

POLIASPIS CASUARINAE Lidgett.

This species was described by Mr. Lidgett upon the branchlets of *Casuarina suberosa* growing at Myrniong, Victoria. I have given the author's description of this species in my Descriptive Catalogue (pt. 1, 1915, p. 49). As the type is, I understand, missing, its determination without fresh specimens from the exact locality will be difficult.

FIORINIA CASUARINAE Maskell.

This species comes from near Perth, W. Australia, upon the branchlets of an undetermined species of *Casuarina*. The puparium of the female white, of the typical elongate form. About 1/12 inch in length. Adult female brown, very small. Male puparium like that of female, but with only one pellicle.

ALECANOPSIS (LECANOPSIS) CASUARINAE Mask.

The adult female is a semiglobular reddish-brown coccid with the outer margins black, fitting close against the wood, with the under surface convex, forming a box-like cavity. Diameter $\frac{3}{8}$ inch.

The type specimens were taken out of the deserted burrow of a wood moth in the centre of a stem of a sheoak (*Casuarina* sp.) in which there was a colony of ants. *Hab.*—Myrniong, Victoria.

This coccid is now placed in Cockerell's genus *Alecanopsis*, the members of which are lecanids which have adopted the habit of living in cavities in tree trunks, or on roots, and are usually associated with ants, which also form nests in the same bores.

Maskell's *Lecanopsis filicum* is the type of the genus; it was collected on the Kurrajong Hills, N. S. Wales, upon the roots of a fern, *Woodia aspera* Green (*Bull. Entom. Research*, ii, 1924). Three more species from Australia: *A. tenuis* from Victoria in the stems of *Banksia integrifolia*, and Green identified specimens which I collected in the stem of *Grevillea robusta* at Bulga, N. S. Wales, as the species. Both of these were attended by ants. *A. merus*, from Townsville, Queens-

land, was found in an ants' nest (*Cremastogaster australis*) in a tree trunk. *A. grandis* was described from specimens on a fern root, in the British Museum collections from Bundarra, N. S. Wales. An attached note recorded that it was taken out of a nest of *Campinotus intrepidus*. The three species which I described in These PROCEEDINGS, 1925, will also come into this genus.

RHIZOCOCCUS CASUARINAE Maskell.

Trans. N. Zealand Inst., xxv, 1892, p. 230, Pl. v, fig. 7.—*The Entomologist*, xxvii, 1894, p. 46.

This coccid is recorded from Myrniong, Victoria, upon *Casuarina suberosa*, and from Cheltenham, Victoria, upon *Casuarina distyla*.

RHIZOCOCCUS LECANOIODES Green.

Bull. Entom. Research, vi, pt. 1, 1915, p. 47, fig. 4.

This species comes from Sandringham, Victoria, upon *Casuarina distyla*.

RHIZOCOCCUS MANCUS Maskell.

Trans. N. Zealand Inst., xxix, 1897, p. 316.

This is the common species about the Sydney coast upon several species of sheoaks, *Casuarina suberosa*, *C. distyla* and *C. rigida*. It is figured in my Cat. Coccidae, pt. ii, p. 66, fig. 48.

RHIZOCOCCUS PUSTULATUS Maskell.

Trans. N. Zealand Inst., xxv, 1892, p. 231, Pl. xv, figs. 8, 9.

This is another species recorded from Myrniong, Victoria, on an undetermined species of *Casuarina*.

RHIZOCOCCUS TRIPARTITUS Fuller.

Journ. W. Aust. Bur. Agric., iv, 1897, p. 1345.—*Trans. Ent. Soc. London*, 1899, p. 443.

This was described from Western Australia on an undetermined species of *Casuarina*.

GOSSYPARIA CASUARINAE Maskell.

Collected in the vicinity of Sydney, upon the branchlets of an undetermined species of *Casuarina*.

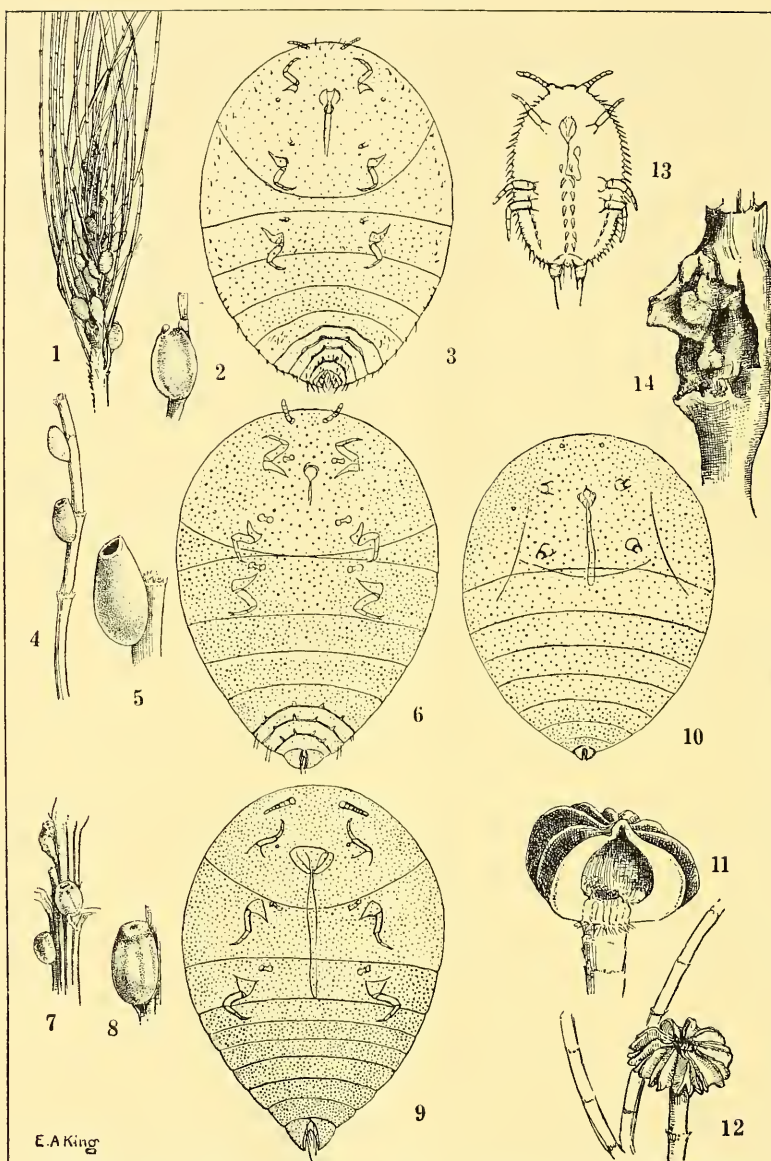
The adult female coccid varies from light to dark brown in colour, is about 1/12 inch in length, and rests upon a pad of woolly matter with the dorsal surface exposed.

ERIOCOCCUS CONSTRICTUS, n. sp. Text-figs. 4-6.

These coccids are solitary, the sacs being scattered over the branchlets of *Casuarina lepidophloia*, Euston, Murray River, N.S.W.

Adult ♀. Sac light reddish-brown, surface smooth, stout, and closely felted; general form elongate-oval, with the apical portion slightly contracted, the anal orifice large, circular. The sac attached to the branch along the ventral surface with the anal tip turning upward. Length 4 mm., height 2 mm.

Adult ♀ coccid dark brown, giving amber tints when boiled in potash. Dorsal surface rounded, ventral surface flattened, extremities rounded. Length $3\frac{1}{2}$ mm. Antennae 7-jointed, rather short, joint 1 broad, 2 rounded at apex, 3 larger, 4 shortest, 5 slender, longer, 6 slender, shorter, 7 about the same length with several fine hairs at the extremity. Legs well developed, femora short and broad, tibia broad, tarsus long, upper edge bearing long hairs, under-surface with shorter



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Text-figs. 1-3.—*Eriococcus fossilis*. 1, group of sacs on branchlets; 2, showing form of sac; 3, ventral surface of adult female.

Text-figs. 4-6.—*Eriococcus constrictus*. 4, sacs on branchlet; 5, showing form of sac; 6, ventral surface of adult female.

Text-figs. 7-9.—*Eriococcus rugosus*. 7, sacs on branchlet; 8, showing structure of sac; 9, ventral surface of adult female.

Text-fig. 10.—*Sphaerococcus ethelae*. Ventral surface adult female.

Text-figs. 11-12.—*Casuarinaloma lei*. 11, showing section of gall; 12, upper surface of gall.

Text-figs. 13-14.—*Sphaerococcus ethelae*. 13, larva; 14, showing aborted tissue of galled wood.

hairs, claw small. Derm clothed with fine pores, some irregularly rounded and fine spines. Anal lobes produced into a pair of large angular plates, slightly arcuate on the inner margins, with six hairs, and several spines on the inner edges.

ERIOCOCCUS CYPRAEAEFORMIS Fuller.

Journ. W. Aust. Bur. Agric., 4, 1897, p. 1345.—*Trans. Ent. Soc. London*, 1899, p. 440.

This curious *Eriococcus* comes from Western Australia, exact locality not given, upon *Casuarina* sp. The figure in my Cat. Coccidae, part ii, p. 79, gives a good idea of the distinct shell-like form.

ERIOCOCCUS ELEGANS Fuller.

Journ. W. Aust. Bur. Agric., 4, 1897, p. 1345.—*Trans. Ent. Soc. London*, 1899, p. 440, Pl. xii, fig. 4.

This species comes from near Perth, W. Australia, upon *Casuarina humilis*.

ERIOCOCCUS FOSSILIS, n. sp. Text-figs. 1-3.

The specimens were collected by Mr. G. F. Hill upon the branchlets of the river oak, *Casuarina Cunninghamiana*, Paddy's River, Canberra.

The adult ♀ sacs cluster together towards the tips of the branches; they are deep biscuit-brown, with the surface very smooth, oval in form, the anal opening very large and raised above the lower margin of the sac. Length 3 to 4 mm.

Larva pink, broadly oval with long six-jointed antennae, legs long and slender, bearing a fine hair and two clubbed digitules; no marginal spines on the cephalic or thoracic segments, but the abdominal ones with a fringe of eleven spines increasing in length to the anal lobe. The anal segment produced into two projecting tubercles each bearing one long and two shorter bristles between them, and a fringe of about ten very fine hairs.

Adult ♀ coccid brown, general form oval. Length $3\frac{1}{2}$ mm., width 2 mm. Antennae slender, 6-jointed, 1 small, 2 short, broad, 3 twice the length of 2, 4 and 5 short, irregularly rounded, 6 longer than 5, arcuate and somewhat irregular in form. Legs moderate, tibia short, tarsus long, terminating in a small sharp, curved claw. Derm lightly clothed with fine spines, with larger spines on the outer margins of the abdominal segments. Segments 4-7 with the upper margins banded with brown chitin, the last three bands angulated. Pygidium large, rounded behind, chitinous, closely shagreened, lobes spade-shaped, serrate on the inner edges, with a fringe of fine hairs between them, outer margins bearing two spines.

ERIOCOCCUS RUGOSUS, n. sp. Text-figs. 7-9.

Collected upon the branchlets of *Casuarina Luehmanni*, Murray River, near Euston, N. S. Wales, scattered over the branchlets usually in groups of two or three.

♀. Puparium dull reddish-brown, short, and broad in proportion, composed of closely felted filaments with the surface slightly roughened, anal extremity truncate, opening large. Length 3 mm.

Adult ♀ brown, giving off purple tint when boiled in potash. The dorsal surface broadly rounded. Length $2\frac{1}{2}$ mm. Derm thickly covered with fine short spines. Antennae slender, composed of 7 segments, tapering to the tips, 1 short and broad, 2 and 3 cylindrical, longer than the first, 5 and 6 bead-shaped, of about equal length, 7 slightly longer, contracted at the tip, clothed with a few fine

hairs. Legs slender, 1st and 2nd pair with the tibia slender, hind pair stouter, tarsus with small tarsal claw. Pygidium forming a pair of projecting triangular ochreous plates with six hairs between them.

PSEUDORIPERSIA BREVIPES, n. sp. Text-figs. 26-28.

This fine species, the second of the genus, comes from Euston, Murray River, N. S. Wales, where I collected it upon the branchlets of *Casuarina lepidophloia*.

The sacs are clustered together in groups of from 5 to 30 upon the smaller branches. They are composed of grey-coloured felted secretion, of much softer material than those of *P. turgipes*, forming a cup-shaped sac in which the ♀ coccid rests, covered with a thin white pellicle, above which is a conical cap of similar material to that of which the sac is composed; it fits within the cup, projecting well above the rim, and is not attached to the basal sac. Height about 3 mm.

Adult ♀ coccid 2 mm. in diameter, subglobular, dorsal surface flattened but showing a slight marginal ridge. Colour dark brown, when boiled in potash giving off a deep green colour. Antennae 6-jointed, 1 and 2 short, 3 longest, 4 and 5 very short, 6 nearly as long as 3. The antennae shorter and smaller than those of *P. turgipes*. Legs similar in general form but shorter. The derm with scattered pores, and irregular bands of spines and pores forming a band round the cephalic, thoracic and abdominal segments; with irregular bands of spines across the lower margin of the abdominal segments. The anal segment, with a pair of pear-shaped lobes between which is the anal ring, which is fringed with stout hairs; a few long spines on either side.

PSEUDORIPERSIA TURGIPES Maskell. Text-figs. 23-25.

This coccid has a wide range and infests the branchlets of a number of different species of *Casuarina*, sometimes singly, but often in groups. The presence of the coccid often causes the branchlet to curve right round. In the vicinity of Sydney they infest *Casuarina suberosa*; in western New South Wales and southern Queensland it is common on the Belah (*C. Cambagei*).

Sac almost globular, 3 mm. in diameter, composed of leathery white secretion slightly roughened on the surface. The base attached to the branchlet, and the apex with a large circular opening in the sac, beneath which the coccid rests, with a convex pad of similar white secretion not attached to the sac, protecting the enclosed coccid and level with the top of the sac.

Morrison gives a detailed account of the adult coccid and larva on page 51 of his "Maskell's Genera of Coccidae", and figures them (fig. 14).

PSEUDOCOCCUS CASUARINAE Maskell.

This species was described from specimens found upon the stems of an undetermined species of *Casuarina* at Myrniong, Victoria.

The adult female is enveloped in an irregular mass of white cottony substance. Yellowish-brown, dorsal surface convex. Length $\frac{1}{8}$ inch.

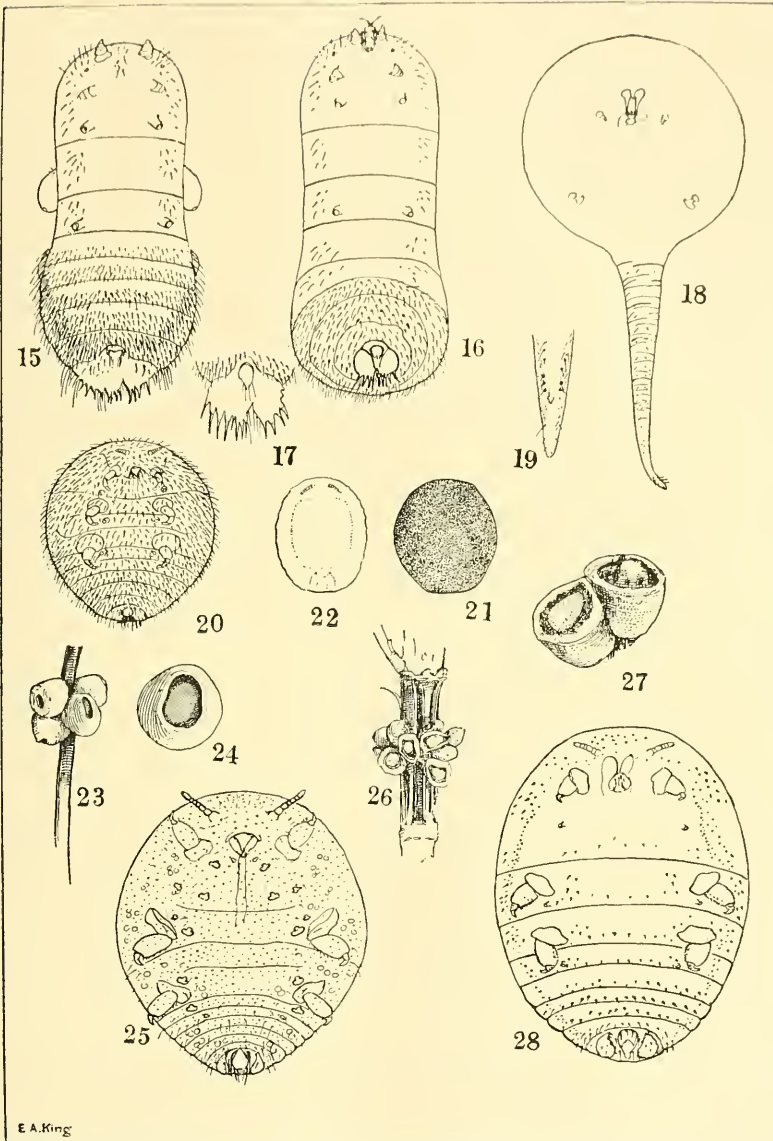
CASUARINALOMA, n.g.

The female coccids forming and living in galls. The male coccids developing within the gall chamber, enclosed in a fine silken sac, usually three or four in number.

Adult ♀ coccid with well developed legs.

CASUARINALOMA (SPHAEROCOCCUS) LEAI Fuller. Text-figs. 11, 12, 20.

Fuller described the type from galls on an undetermined species of *Casuarina* collected near Perth, W. Australia. Mr. J. Macqueen sent me specimens from



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Text-figs. 15-17.—*Cylindrococcus spiniferous*.Text-figs. 18-19.—*Frenchia casuarinae*. 18, adult female; 19, anal segment.Text-fig. 20.—*Casuarinaloma leai*. Ventral surface, adult female.Text-figs. 21-22.—*Gymnaspsis serratus*. 21, dorsal surface, adult female; 22, ventral surface.Text-figs. 23-25.—*Pseudoripersia turgipes*. 23, cluster of sacs; 24, single sac, viewed from above; 25, ventral surface, adult female.Text-figs. 26-28.—*Pseudoripersia brevipes*. 26, group of sacs; 27, sacs viewed from above; 28, ventral surface, adult female.

Millmerran, Queensland, from *Casuarina* sp. I found them plentiful upon *Casuarina Cambagei* at Trangie, N. S. Wales, and upon the branchlets of *C. Luehmanni* near Euston, Murray River, N. S. Wales.

The galls are in clusters of three or four, or singly upon the tips of the branchlets; they measure 6 mm. in diameter, flattened on the summit with the sides deeply cleft into from 12 to 10 segments, forming a circular solid but thin-walled gall which somewhat resembles the seed capsule of a marsh-mallow.

♂. Coccids developed inside the gall-chamber; in matured galls there are often three or four white oval silken puparia open at the apex. Males red, wings white, head broad, the antennae composed of small irregular segments, fringed with hairs; body short, segments slender, terminal one lance-shaped.

♀. Coccid broadly rounded, convex, rounded on the dorsal surface. Diameter $1\frac{1}{2}$ mm. Colour red. Antennae composed of six small somewhat irregular joints. Legs well developed, femur large, rounded, tibia short, broad; tarsus long, terminating in a fine curved point. Derm thickly covered with stout finely-pointed spines, no distinct pores, but the whole surface finely shagreened. Anal lobes very small, inconspicuous, bearing three hairs, the central one longest, the anal ring apparently between them in a slight depression.

Larva: I have never seen the larva, but Fuller says, "Larva elongate fringed with spines. Anal tubercles bearing setae and spines. Antennae 6-jointed. Legs thick, tarsus slightly longer than tibia. Upper and lower digitules knobbed. Colour crimson."

A bunch of the galls is figured in my Descriptive Catalogue of Australian Coccidae, part ii, 1921.

Fuller placed this species in Maskell's genus *Sphaerococcus*, but this genus is defined "legs absent or atrophied", so that the possession of three pairs of well developed legs places this species outside this genus.

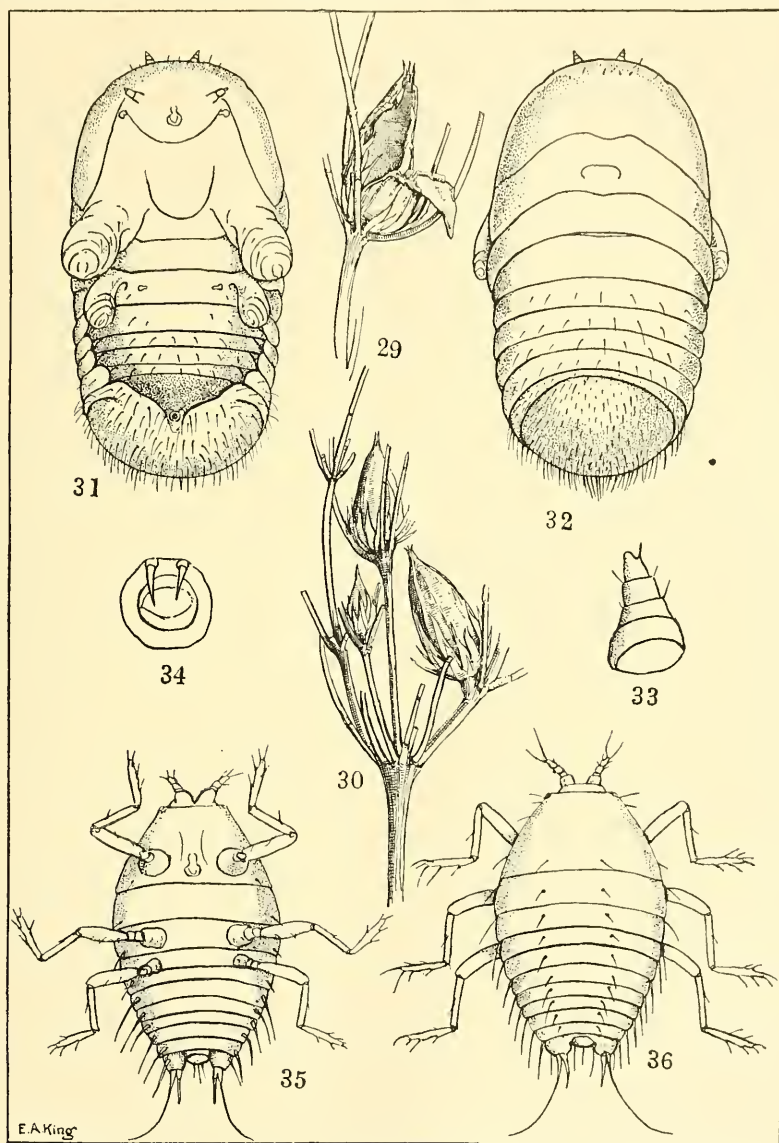
FRENCHIA CASUARINAE Maskell. Pl. xxix, fig. 4; Text-figs. 18, 19.

The type specimens came from Victoria, on the stems of *Casuarina quadrivalvis*. My specimens were collected by Mr. C. French, Jr., on the same species of sheoak growing near Geelong, Victoria. I have also found this species in New South Wales on an undetermined species of sheoak, but it is a rare gall in this State. It is found in Tasmania on *C. quadrivalvis*. These galls are gregarious; they are usually in numbers on each infested branch, often so close to each other that the basal swollen wood tissue or false galls are in contact. This swollen tissue with the covering bark surrounds the true gall in which the coccid is imprisoned.

This gall is a rounded, smooth, dark brown, hard, wooden tube, projecting above the swollen tissue about 10 mm. The apex is nipple-shaped, ringed, and light reddish-brown; the apex closed with a truncate circular plug, which protects the coccid until the larvae are ready to emerge. The gall is about 4 mm. in diameter in the centre, but at the hidden base much enlarged, fitting against the sapwood; it is 8 mm. in diameter; the combined length of basal stem and erect tube is about 15 mm. When the tubular gall is cut out and detached there is a circular scar in the sapwood beneath. Here, fitting into the base of the tube between the scar and the cephalic portion of the adult female, is a rounded, yellow, waxy object, with a curved horn-like process in the centre. Maskell called it the indusium, or third gall. Morrison, in his examination of Maskell's material, said that Maskell was in error; he says: "The second stage as described

by Maskell is in reality a first stage larva about to moult." I have had a great number of fresh galls through my hands, and in every one containing a live adult female, this second stage larva is present.

Adult ♀ is reddish-yellow with a little white floury meal scattered over it on the under-surface, but more thickly coated on the upper surface. The cephalic



Text-figs. 29-36.—*Cyindrococcus amplior*. 29, showing section of gall; 30, group of galls; 31, ventral surface, adult female; 32, dorsal surface, adult female; 33, antennae, adult female; 34, anal ring; 35, ventral surface of larva; 36, dorsal surface of larva.

portion coalesced with the thoracic segments forming a thickened rounded disc, the abdominal segments contracted into a slender tapering tubular tail. Diameter of disc 6 mm., thickness 1 mm., abdominal tail from disc to tip 6 mm. When alive it might be likened to a slender-stalked mushroom. Morrison, in his definition of the genus *Frenchia*, places it in the subfamily Dactylopinae; he figures the larvae and details of the adult coccid, and concludes with a diagnosis of the genus.

FRENCHIA SEMIOCCULTA Maskell. Plate xxix, fig. 5.

The galls upon which Maskell formed this species were collected by the writer upon the branchlets of *Casuarina suberosa* at two localities near Sydney. In this species the galls form a double swelling on the branchlet like two lips, with a cleft between them, at the base of which is a cavity containing the coccid. The specimens figured are immature galls. I collected a somewhat similar gall on the branchlets of *Casuarina Luehmanni* near Euston, on the Murray River, N.S.W.

The adult ♀ coccid resembles the preceding species in general form and colour, but is much smaller and the abdominal segments are not so elongated. In Morrison's paper, "The Maskell Species of Scale Insects of the Subfamily *Asterolecaniinae*", this species is described at length on pages 22-24, and the details are given on Plates 14 and 15.

SPHAEROCOCCUS ETHELAE Fuller. Text-figs. 10, 13, 14.

The ♀ coccids are gregarious, their presence causing scars upon the branches of several species of *Casuarina*; they can hardly be called gall-makers. Fuller described the type from the branches of a *Casuarina*, Swan River, W.A.

Collecting on the banks of the Murray River, near Euston, N. S. Wales, I found many of the stunted sheoak, *Casuarina Luehmanni*, with the branches infested with abandoned galls of *Frenchia semiocculta*, many branchlets having snapped off at the double-lipped gall. These damaged tips were aborted in irregular scars covered with white flocculent matter looking like woolly aphids. These woolly filaments covered several coccids further protected with thin silvery-white plates, the last folded over the coccid.

♀. Coccid 1½ mm. in length, chocolate-brown, when treated with potash giving out a bright green tint. Derm thickly covered with small circular pores. Antennae small, indistinct. Legs rudimentary, four in number, represented by two pairs of raised irregularly rounded coriaceous plates, from which project short tubular processes (tibiae?) with a fine prong on either side. Anal plate chitinous, basal portion finely granulated. Anal lobes short, broad, and projecting slightly.

Larva found in cavity with adult female of very distinctive form as figured. Further investigations into the structure of this coccid may place it in a new genus. All the coccids in the galls were dead and dry.

CYLINDROCOCCUS AMPLIOR Maskell. Pl. xxix, fig. 1; Text-figs. 29-36.

The type specimens were sent to Maskell from near Adelaide, S. Australia, on the branchlets of *Casuarina quadrivalvis*. I have specimens from Glen Osmond, S. Australia (J. Davidson), on *C. stricta*; Victoria (C. French, Jr.), on *C. quadrivalvis*; Millmerran, Southern Queensland (J. Macqueen), on *C. torulosa*; Gilgandra, N.S.W. (G. A. Withers), on stems of *Casuarina* sp.

The drawings were made from living unmounted specimens as well as mounted specimens. In general form and structure, and enfolding of the larvae, the adult female resembles *C. casuarinae*. It is somewhat larger and broader, measuring 6 mm. in length and 4 mm. in diameter. Of the same reddish-brown

tint, with the colour obscured by white floury secretion. The antennae cone-shaped, composed of 4 segments, with single spines on the sides of the apical ones. The dorsal surface showing ten segmental divisions, the apical one broadly oval, chitinous, brownish-yellow, thickly covered with fine spines, with the margin fringed with longer stouter ones. A few larger spines across the other abdominal segments, but they are not fringed with fine yellow spines as in *C. casuarinae*. The ventral surface very similar. Anterior legs short and aborted, with the prolonged lobes of the thoracic segments ringed and broadest at the base; the lower pair not projecting. The anal ring distinct, with two stout spines. The larvae do not appear to differ from those of *C. casuarinae*. The galls are apparently also formed from a branchlet bud, with the leaves forming a cup of elongated bracts like an acorn, and not attached to the sides of the central gall. This is reddish-brown, but the surface is covered with greyish down. Smooth, broad, and round at the base, it has the sides ribbed, lightly at the base, but more distinctly channelled to the pointed apex. They vary from 20 to 25 mm. in length, and from 5 to 12 mm. in diameter. The gall chamber is slender and oval, but the walls are solid at the base, and thickened on the sides to the extremity.

CYLINDROCOCCUS CASUARINAE Maskell. Pl. xxix, fig. 2.

The type specimens were collected near Melbourne, Victoria, upon the branches of *Casuarina quadrivalvis*. I have examined a number of living and mounted specimens taken from fresh galls on the same species of sheoak collected near the same locality by C. French, Jr., this year.

I have also recently taken this gall upon the foliage of *Casuarina stricta* growing on a headland near Newport, N. S. Wales.

Morrison, in his paper, "A redescription of the type species of the genera of Coccidae based on species originally described by Maskell", considers this species the type of the genus *Cylindrococcus*. In describing it, he figures the larva and adult female with details of the external appendages. His descriptions are based upon material boiled in potassium hydroxide; I would give some notes on the general appearance of the living coccids when removed from the galls, with an account of the origin and structure of the galls.

Adult female dark reddish-brown, but smothered in white floury secretion, which is easily rubbed off. They vary in size from $4\frac{1}{2}$ to 5 mm. in length, and 2 mm. in diameter, and rest loosely on the lower half of the gall chamber, with the ventral cavity packed with hundreds of minute dark red larvae, which crawl out all over the paper when the coccid is laid on her back.

The general form is cylindrical, rounded at the extremities, with the 4-jointed conical pointed antennae projecting above the apex of the cephalic segment, but not as much as in *C. amplior*. The dorsal surface is rounded, showing eleven segmental divisions; the cephalic rounded, 1st thoracic largest, 2nd and 3rd about the same size, with the first six abdominal segments narrow and of uniform width; the 7th forming a smooth circular conical plate, coriaceous, when examined under the lens seen to be covered with very fine spines which fringe the outer margin and cross the six abdominal segments; it curves round to the ventral side, and with the outer margins of the six abdominal segments folds over, forming the well defined pouch or cavity previously noted, in which the larvae assemble and remain for some time before emergence. Viewed when resting on its back, it might be likened to a little rubber doll, the antennae projecting like ears, the anterior legs, spiracles and impressed rostrum forming the face. The 1st thoracic segment is swollen out on either side into a nipple-like process in the immature

female, but in the adult is flattened, rounded at the extremity and folded over the side of the body, the 3rd thoracic segment with a similar projecting process but much smaller. These extraordinary appendages may represent legs, as Morrison says, but I am inclined to think the adult females have only a pair of forelegs.

Galls: These are sessile, springing out from the ringed ridges on the smaller stems, and appear to be developed from a branchlet bud, and the basal bracts or scales on the lower third of the gall represent the rudimentary leaves which encircle the normal branchlet.

When there are several galls on the same node, the pointed bracts form an expanded fringe round the base, but in solitary galls they fit more closely round the surface of the gall. The galls are faintly-ribbed thin tubes, closed at the extremities until they are quite mature.

CYLINDROCOCCLUS SPINIFEROUS Maskell. Pl. xxix, fig. 3; Text-figs. 15-17.

This is the most abundant gall along the foreshores of Sydney Harbour, in the early summer, covering the branchlets of *Casuarina suberosa* with its bracteate seed-cone-like galls. Though their structure is identical, they vary very much in form during their development. The pointed bracts apparently produced from the rudimentary leaves being thin, and fitting over each other like a small pine cone with the pointed tip of the thin central tube enclosing the female coccid projecting at the apex. In the old mature galls, the bracts are thickened, coalesced at the base, forming a squat gall, with the apex depressed-convex and perforated in the centre.

The type specimens came from Victoria. Mr. Charles French collected them upon *Casuarina quadrivalvis* near Melbourne. It is recorded upon the same species from South Australia and New South Wales.

The living larvae are bright red, and cluster together in the cavity on the ventral surface of the mother. They are shield-shaped, but more elongate and rounded at the apex than the other two species, with similar 4-jointed antennae and legs, but the fringe of fine spines along the sides is not so prominent, though the outer long spines on the anal lobes are slightly longer.

Adult ♀. Length 6 mm., diameter 4 mm. Red, with the tip of the abdomen black; the ventral thoracic segments sometimes variegated with black spots. General form cylindrical, apex truncate, broadest, deeply wrinkled and pitted. Dorsal surface smooth and rounded, showing five large and four narrow red segmental divisions, with one fine black one round the black circular convex tip, which is clothed with fine spines. The ventral surface with the cephalic region much wrinkled and contracted; the thoracic segments smooth, swollen on the sides, but without the nipple-like projections of the immature females. Impressed in the centre with a smooth angular area above the first abdominal segment. Abdominal segments depressed and flattened on the central area, but the outer margins raised, consisting of six narrow segments, with the circular convex tip turning inwards forming an abdominal cavity in which the larvae are massed together.

EXPLANATION OF PLATE XXIX.

1. Galls of *Cylindrococcus amplior*.
2. Galls of *Cylindrococcus casuarinae*.
3. Different forms of galls of *Cylindrococcus spiniferous*.—Sessile, stalked and upon seed-cone.
4. Galls of *Frenchia casuarinae*.
5. Galls of *Frenchia semiocculta*.